

CLAIMS:

1. A method of resisting corrosion of metals in a concrete structure comprising,  
creating an overlay containing at least one compound capable of sequestering chloride ions,  
securing said overlay adjacent to said concrete structure, and  
sequestering chloride ions in said overlay.
2. The method of Claim 1 including  
securing said overlay to said concrete structure to permit chloride ion exchange therebetween.
3. The method of Claim 2 including  
creating said overlay on said concrete structure.
4. The method of Claim 2 including  
preforming said overlay, and  
securing said preformed overlay to said concrete structure.
5. The method of Claim 4 including  
securing said preformed overlay to said concrete structure by adhesive.
6. The method of Claim 1 including  
effecting said securing to establish surface-to-surface contact between said overlay and said concrete structure.
7. The method of Claim 1 including  
applying said overlay to said concrete structure as a slurry.
8. The method of Claim 7 including  
applying a second layer of said overlay over said slurry.
9. The method of Claim 8 including  
providing said second layer with lower porosity than said slurry layer.
10. The method of Claim 1 including

employing a material selected from the group consisting of concrete, asphalt, Portland cement, clay, calcium aluminate cement, and mortar in said overlay.

11. The method of Claim 1 including introducing high ionic strength liquid into said overlay.
12. The method of Claim 1 including employing said method on a concrete structure disposed at least partially under water.
13. The method of Claim 1 including performing said process without requiring ongoing input of electrical energy.
14. The method of Claim 1 including establishing said overlay with a thickness of about 0.5 to 10 inches.
15. The method of Claim 1 including employing as said compound a compound capable of establishing a corrosion resistant oxide layer on embedded metal elements.
16. The method of Claim 1 including effecting said chloride sequestration in a low-solubility compound.
17. The method of Claim 1 including employing a nitrite-containing compound as said compound.
18. The method of Claim 1 including employing said method on metal elements made of steel.
19. The method of Claim 2 including employing as said compound, a compound capable of liberating nitrite ions.
20. The method of Claim 1 including employing as said compound a compound selected from the group consisting of

$3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca}(\text{NO}_2)_2\cdot n\text{H}_2\text{O}$ ;  $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca}(\text{NO}_3)_2\cdot n\text{H}_2\text{O}$ ;  
 $3\text{CaO}\cdot\text{Fe}_2\text{O}_3\cdot\text{Ca}(\text{NO}_2)_2\cdot n\text{H}_2\text{O}$ ; and  $3\text{CaO}\cdot\text{Fe}_2\text{O}_3\cdot\text{Ca}(\text{NO}_3)_2\cdot n\text{H}_2\text{O}$

wherein  $n = 0$  to  $24$ .

21. The method of Claim 2 including  
employing as said compound a compound selected from the  
group consisting of  $3\text{Me(II)O}\cdot\text{R}_2\text{O}_3\cdot\text{Me(II)(anion)}_2\cdot n\text{H}_2\text{O}$  and  
 $3\text{Me(II)O}\cdot\text{R}_2\text{O}_3\cdot\text{Me(II)(anion)}\cdot n\text{H}_2\text{O}$ ,

wherein  $\text{Me(II)}$  is one or more cations,  $\text{R}_2$  is  $\text{Al}_2$ ,  $\text{Fe}_2$  or  $\text{Cr}_2$ ,  
anion is  $\text{NO}_2$ ,  $\text{NO}_3$ ,  $\text{CO}_3$ ,  $\text{BO}_4$ , or  $\text{OH}$  and  $n$  is  $0$  to  $24$ .

22. The method of Claim 14 including  
establishing said overlay with a thickness of about  $1$  to  $4$  inches.

23. The method of Claim 2 including  
employing as said compound, a compound selected from the  
group consisting of  $\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca(NO)}_2\cdot n\text{H}_2\text{O}$  and  $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca(NO}_3)_2\cdot n\text{H}_2\text{O}$   
wherein  $n = 0$  to  $24$ .

24. The method of Claim 1 including  
said metal elements being embedded reinforcing elements.

25. The method of Claim 1 including  
effecting said compound introduction into ingredients of said  
concrete prior to creating said overlay.

26. The method of Claim 1 including  
effecting said overlay creation by mixing said compound in dry  
form with cement in dry form and subsequently adding water to said compound and  
cement mixture.

27. The method of Claim 26 including  
adding other ingredients to said mixture prior to adding said  
water.

28. The method of Claim 2 including  
employing said compound in the following reaction to create  
the chloride-sequestering compound and to establish said corrosion resistant oxide  
layer  $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca(NO}_2)_2\cdot n\text{H}_2\text{O} + 2\text{Cl}^- \Rightarrow 3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{CaCl}_2\cdot n\text{H}_2\text{O} + 2\text{NO}_2^-$   
wherein  $n = 0$  to  $24$ .

29. A concrete assembly comprising  
a concrete structure,

a plurality of metal elements within said concrete structure,  
an overlay containing a compound capable of sequestering  
chloride ions disposed within said concrete structure, and

said concrete structure and said overlay being disposed in  
close adjacency to permit ion exchange between pores of said concrete structure and  
said overlay.

30. The concrete structure of Claim 29 including  
said concrete structure being a portion of a bridge.
31. The concrete structure of Claim 29 including  
said concrete structure being a portion of a pier.
32. The concrete structure of Claim 29 including  
said concrete structure being a portion of a highway.
33. The concrete structure of Claim 29 including  
said concrete structure being a portion of a parking garage or  
parking lot.
34. The concrete structure of Claim 29 including  
said compound being capable of establishing a corrosion  
resistant oxide layer on said metal reinforcing elements.
35. The concrete structure of Claim 29 including  
said chloride ion sequestering compound being a low-  
solubility compound.
36. The concrete structure of Claim 29 including  
said chloride ion sequestering compound being a compound  
containing nitrite.
37. The concrete structure of Claim 29 including  
said compound being selected from the group consisting of  
 $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca}(\text{NO}_2)_2\cdot n\text{H}_2\text{O}$ ;  $3\text{CaO}\cdot\text{Al}_2\text{O}_3\cdot\text{Ca}(\text{NO}_3)_2\cdot n\text{H}_2\text{O}$ ;  
 $3\text{CaO}\cdot\text{Fe}_2\text{O}_3\cdot\text{Ca}(\text{NO}_2)_2\cdot n\text{H}_2\text{O}$  and  $3\text{CaO}\cdot\text{Fe}_2\text{O}_3\cdot\text{Ca}(\text{NO}_3)_2\cdot n\text{H}_2\text{O}$  wherein  $n = 0$  to  
24.
38. The concrete structure of Claim 29 including  
said compound being selected from the group consisting of  
 $3\text{Me(II)O}\cdot\text{R}_2\text{O}_3\cdot\text{Me(II)(anion)}_2\cdot n\text{H}_2\text{O}$  and  $3\text{Me(II)O}\cdot\text{R}_2\text{O}_3\cdot\text{Me(II)(anion)}\cdot n\text{H}_2\text{O}$

wherein Me(II) is one or more cations, R<sub>2</sub> is Al<sub>2</sub>, Fe<sub>2</sub> or Cr<sub>2</sub>, anion is NO<sub>2</sub>, NO<sub>3</sub>, CO<sub>3</sub>, BO<sub>4</sub>, or OH and n is 0 to 24.

39. The concrete structure of Claim 38 including said compound being selected from the group consisting of 3CaO·Al<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>2</sub>)<sub>2</sub>·nH<sub>2</sub>O and 3CaO·Al<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>3</sub>)<sub>2</sub>·nH<sub>2</sub>O wherein n = 0 to 24.

40. A compound capable of sequestering chloride comprising a compound selected from a group consisting of 3CaO·Al<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>2</sub>)<sub>2</sub>·nH<sub>2</sub>O wherein n = 0 to 24, 3CaO·Al<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>3</sub>)<sub>2</sub>·nH<sub>2</sub>O; and 3CaO·Fe<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>2</sub>)<sub>2</sub>·nH<sub>2</sub>O; wherein n = 0 to 24.

41. The compound of Claim 40 including said compound selected from the group consisting of 3CaO·Al<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>2</sub>)<sub>2</sub>·nH<sub>2</sub>O, and 3CaO·Fe<sub>2</sub>O<sub>3</sub>·Ca(NO<sub>2</sub>)<sub>2</sub>·nH<sub>2</sub>O wherein n = 0 to 24.

42. The method of Claim 1 including employing the following reaction in sequestering said chloride ions

$$3\text{CaO} \cdot \text{Fe}_2\text{O}_3 \cdot \text{Ca}(\text{NO}_2)_2 \cdot n\text{H}_2\text{O} + 2\text{Cl}^- \Rightarrow 3\text{CaO} \cdot \text{Fe}_2\text{O}_3 \cdot \text{CaCl}_2 \cdot n\text{H}_2\text{O} + 2\text{NO}_2^-$$

wherein n = 0 to 24.